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A checklist of Iranian *Telenomus* HALIDAY (Hymenoptera: Platygastroidae: Scelionidae: Telenominae)

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A b s t r a c t : *Telenomus* HALIDAY 1833 (Hymenoptera: Platygastroidae: Scelionidae) are one of the powerful parasitoids on several agricultural pests. In a total 10 *Telenomus* species were determined as the fauna of Iran so far. In this research, additionally summarizing of Iranian *Telenomus* species, three new records are added to the list. Synonymies, hosts and distributional data are given for all the species.

K e y w o r d s : *Telenomus*, Scelionidae, Parasitoid, Fauna, New record, Iran.

Introduction

Scelionid wasps (Hymenoptera: Scelionidae) are parasitoids of the eggs of other arthropods, that is, females lay their own eggs within the eggs of other species of insects or spiders (MASNER 1993, 1995). Telenominae is the most important subfamily in Scelionidae which included several efficient parasitoids. Among the telenomines, the most important one from agricultural perspective is the genus *Telenomus* HALIDAY, with more than 600 species reported worldwide. Species of *Telenomus* (Scelionidae) are tiny egg parasitoids of Lepidoptera, Hemiptera, Diptera, and Neuroptera. More than 100 Palaearctic species have been described, but the true number is probably at least 2-3 times greater. The genus can be divided in distinct species groups defined by both morphological and biological characteristics, all the parasitoids of Lepidoptera forming a monophyletic clade consisting of several species groups sensu JOHNSON (1984). *Telenomus* species are generally bisexual though a few species are known to have extreme female bias, probably thelytokous. The great majority of species lay their eggs in masses, but only very few oviposit single eggs. Both egg shape and surface-borne chemicals seem to be important for host acceptance. Although, only one parasitoid develops per host egg normally, but for larger hosts 5-10 parasitoids can be reared from a single egg (POLASZEK & KIMANI 1990; KONONOVA 1992; AUSTIN et al. 2005). *Telenomus* spp. gain substantial economic and ecological importance. They are egg parasitoids of many lepidopteran stem-borers of a wide variety of crops including, rice and sugarcane.

The fauna of Iranian Scelionidae and consequently *Telenomus* species was poorly studied (MODARRES AWAL 1997) so far. The aim of this research is summarizing the published data on Iranian *Telenomus*, and presenting a checklist on Iranian *Telenomus* for using by researchers who will work on this taxon.

Material and Methods

The published data on Iranian *Telenomus* is summarized in this paper. Also, the original material was collected in different regions of the country, mainly by sweeping net and malaise trap. A few species was reared at laboratory conditions (26±2 °C, 65±5 %RH, 14: 10 L: D) from the related hosts. The checklists comprise the following data: the valid taxa name, published records with provincial distribution, synonyms; original data: province and locality, month and year of collecting, number and sex of specimens, host (in case of rearing); general distribution. Studied material was identified using insect manipulator (BOYADZHIEV & BOZHINOVA 2006) by the second author.

Results

Totally ten species of *Telenomus* is listed in this paper as the fauna of Iran. The list of species with synonymies, hosts and distributional data are given below.

Family Scelionidae (HALIDAY 1840)

Subfamily Telenominae THOMSON 1860

Genus *Telenomus* HALIDAY 1833

Telenomus acrobates GIARD 1895

Synonym: *Phanurus acrobates* KIEFFER 1926.

Distribution in Iran: Tehran (SHAHPOURI ARANI et al. 2005), East Azarbayjan (SAMIN et al. 2010).

Host in Iran: *Chrysoperla carnea* (STEPHENS) (Neuroptera: Chrysopidae) (SHAHPOURI ARANI et al. 2005).

General distribution: France (GIARD 1895), Italy (KIEFFER 1926), Roumania (FABRITIUS 1974), Moldavia, Kazakhstan, Central Asia (KOZLOV & KONONOVA 1983), Japan (RYU & HIRASHIMA 1985).

Telenomus busseolae GAHAN 1922

Synonyms: *Platytenomus hylas* NIXON 1935; *Platytenomus busseolae* MASNER 1965.

Distribution in Iran: Khuzestan (ABBASIPOUR et al. 1991; ABDUL RAZZAGH 1995; ABBASIPOUR 2004), East Azarbayjan (SAMIN et al. 2010).

Host in Iran: Lepidoptera, Noctuidae: *Sesamia nonagrioides* LEFEVBRE (ABBASIPOUR et al. 1991; ABDUL RAZZAGH 1995; ABBASIPOUR 2004), *Sesamia cretica* LEDERER (NAREHI et al. 2004).

General distribution: South Africa (GAHAN 1922; POLASZEK & KIMANI 1990), Israel (KOZLOV & KONONOVA 1983), Cameroon, Egypt, Ghana, Kenya, Mauritius, Nigeria, Reunion, Senegal, Sudan, Uganda, Bangladesh, Greece, Iraq, Iran (POLASZEK & KIMANI 1990).

***Telenomus chloropus* (THOMSON 1861)**

Synonyms: *Phanurus chloropus* THOMSON 1861; *Telenomus sokolowi* MAYR 1897; *Telenomus mayri* SOKOLOV 1904; *Prophanurus sokolowi* KIEFFER 1912; *Telenomus tischleri* NIXON 1939; *Telenomus sokolovi* MEIER 1940.

Distribution in Iran: Tehran, Isfahan (MODARRES AWAL 1997), Mazandaran (MOHAGHEGH NEYSHABOURI 1993), East Azarbayjan (SAMIN et al. 2010).

Host in Iran: Hemiptera, Pentatomidae: *Eurygaster integriceps* PUT. (MODARRES AWAL 1997), *Eurygaster testudinaria* GEOFFROY (MOHAGHEGH NEYSHABOURI 1993), *Dolycoris baccarum* L. (KHANJANI 2003).

General distribution: Ukraine (KIEFFER 1926; KOZLOV & KONONOVA 1983), Turkey (LODOS 1961), England (JAVAHERY 1968), Russia, Moldavia, Kazakhstan, Georgia, Kazakhstan, Far East (KOZLOV & KONONOVA 1983), France, Hungary, Japan, Spain, Sweden, Mississippi USA (JOHNSON 1984), Ireland (O'CONNOR & MINEO 2009).

***Telenomus chrysopae* ASHMEAD 1893**

Synonym: *Phanurus chrysopae* KIEFFER 1926.

Distribution in Iran: Isfahan (RAKSHANI et al. 2008), East Azarbayjan (SAMIN et al. 2010). Also, this species was collected from some regions as below. Golestan province: Gorgan, 1♀, August 2006, reared from *Catolaccus* sp. (Hymenoptera: Pteromalidae). Isfahan province: Isfahan, 2♀♀, July 2002, reared from *Chrysoperla carnea* (STEPHENS).

Host in Iran: *Chrysoperla* sp. (Neuroptera: Chrysopidae) (RAKSHANI et al. 2008).

General distribution: Palearctic, Nearctic, Oriental (JOHNSON 1992).

***Telenomus dignus* GAHAN 1925**

Synonym: *Phanurus matsumurai* ISHIDA 1931.

Material: Kerman province: Jiroft, 2♀♀, 1♂, June 2003. **New record for Iran.**

Host in Iran: *Scirpophaga* sp. (Lepidoptera: Pyralidae).

General distribution: Oriental. Formosa, China, Japan, Java, Korea, Philipinnes (RYU & HIRASHIMA 1985), Pakistan (ISHTIAQ 2002), India (RAJMOHANA 2006).

***Telenomus heydeni* MAYR 1879**

Distribution in Iran: West Azarbayjan (PARVIZI & JAVAN MOGHADDAM 1988).

Host in Iran: Coleoptera, Curculionidae: *Lixus incanescens* BOHEMAN (PARVIZI & JAVAN MOGHADDAM 1988).

General distribution: Austria (MAYR 1879), Germany (KIEFFER 1926), Kazakhstan, Moldavia, Russia, Trans-Caucas (KOZLOV & KONONOVA 1983), Turkey (LODOS 1982).

***Telenomus minimus* ASHMEAD 1893**

S y n o n y m : *Phanurus minimus* KIEFFER 1926.

D i s t r i b u t i o n i n I r a n : Guilan, Mazandaran (MODARRES AWAL 1997).

H o s t i n I r a n : Unknown.

G e n e r a l d i s t r i b u t i o n : Virginia USA (ASHMEAD 1893), Moldavia, Russia (KOZLOV & KONONOVA 1983).

***Telenomus phalaenarum* (NEES & ESENBECK 1834)**

S y n o n y m s : *Teleas phalaenarum* NEES ab ESENBECK 1834; *Prophanuruss phalaenarum* KIEFFER 1912; *Asolcus phalaenarum* SZABO 1976.

M a t e r i a l : Kermanshah province: Islam-Abad Gharb, 2 ♀ ♀, September 2004. **New record for Iran.**

H o s t i n I r a n : Unknown.

G e n e r a l d i s t r i b u t i o n : Palearctic (JOHNSON 1992).

***Telenomus politus* (THOMSON 1861)**

S y n o n y m : *Phanurus politus* THOMSON 1861.

D i s t r i b u t i o n i n I r a n : Tehran (MODARRES AWAL 1997).

H o s t i n I r a n : Hemiptera, Pentatomidae: *Eurygaster intergriceps* PUTON (MODARRES AWAL 1997).

G e n e r a l d i s t r i b u t i o n : Sweden (THOMSON 1861), Russia (KOZLOV 1978).

***Telenomus sechellensis* KIEFFER 1910**

S y n o n y m s : *Telenomus sechellensis* KIEFFER 1912; *Telenomus truncativentris* DODD 1920; *Microphanurus sechellensis* KIEFFER 1926; *Trissolcuss sechellensis* MANI & SHARMA 1982.

M a t e r i a l : Khuzestan province: Andimeshk, 1 ♀, August 2002. **New record for Iran.**

H o s t i n I r a n : Unknown.

G e n e r a l d i s t r i b u t i o n : African and Oriental regions (JOHNSON 1992).

Discussion

Upon the results of this paper the list of Iranian *Telenomus* (Hymenoptera: Scelionidae) is increased to ten species. This paper deals with only one genus *Telenomus*, while other scelionid genera especially *Scelio* LATREILLE 1805 and *Trissolcus* ASHMEAD 1893 are both diverse in the country and efficient parasitoids on some key pests. Therefore, reviewing and summarizing of these genera is necessary too. Upon the several samplings in different regions of Iran by many researchers, many other scelionid specimens were collected which are studied. One of the important topics in collecting of Scelionid wasps is applying of efficient sampling method. Although the main sampling method for col-

lecting these parasitoids by researchers are sweeping net and other available methods, but malaise traps are among the most important instruments for collecting day-flying (and in moonlit nights to some degree also night-flying species) of Hymenoptera and Diptera. Also other groups are collected, but in general less efficiently depending on the flying and searching activities of the species involved. Malaise traps are a special kind of flight interception trap for collecting insects with positive phototropism into the collection bottle of the collector. Nevertheless, Malaise traps are among the first choice for an extended survey like an ATBI (All Taxa Biodiversity Inventory) of a wide range of taxa. Large numbers of specimens may be collected and if properly placed for several weeks or months in the right season it gives a good sampling of the present flying insects. Depending on the size of the trap, usually from near-ground level up to 0.8 m height, there is a good sampling of the micro-habitat. Usually the traps are situated in a corridor between emerging vegetation, but they can be used in nearly every habitat. The designs are generally fairly weather resistant except for winter conditions with heavy (melting) snow loads on the roof of the trap. The traps are fairly portable and one person can set up a trap (DARLING & PACKER 1988; ACHTERBERG 2009). However, continuous of faunistic surveys on Iranian Scelionidae is very necessary for determining and completing of Iranian fauna.

Scelionidae are one of the taxonomic groups which identification of some species and species-groups are difficult by the usual systematic methods. Same as some other hymenopteran families especially Braconidae, scelionid wasps needs the modern methods as DNA sequence, mitochondrial studies and etc. for careful determination and resolving deep-level phylogenetic relationships. Recent preliminary work has shown that gene rearrangements are widespread within the mitochondrial genome of the Platygastroidea, and that they are likely to be useful as phylogenetic markers (DOWTON et al. 2002a, b). However, they are also likely to serve as a useful model for investigating the nature of mitochondrial gene rearrangements per se, given that the few taxa sequenced to date show both simple and more complex gene rearrangements. These complex gene movements cannot be easily explained by the duplication/random loss model invoked for vertebrates, and more sophisticated mechanisms need to be considered and explored (AUSTIN et al. 2005).

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Zusammenfassung

Arten der Gattung *Telenomus* HALIDAY 1833 (Hymenoptera: Platygastridae: Scelionidae) gehören zu den wirksamsten parasitoiden Gegenspielern im Kampf gegen Agrarschädlinge. Bisher konnten aus dem Iran 10 Arten nachgewiesen werden, 3 davon als Erstnachweise in dieser Arbeit. Für alle genannten Spezies werden Synonymie, Wirte und Verbreitungsdaten angegeben.

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